body view. None of the facts explicable by the amboceptor appear to become inexplicable when this body is analyzed into an agglutinin and a lipolysin. As for the difficulties of constant association, these are no greater in this case than the difficulties which arise because serum albumin and serum globulin always occur together in the blood.

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DESCRIPTION OF A PECULIAR YOLK MASS IN THE OVIDUCT OF A HEN

A DESCRIPTION of this specimen seems desirable for two chief reasons: First, because of its unique nature; second, because it supplies the data with which to answer the question whether reverse movement, possibly antiperistalsis, occurs in the formation of double eggs and similar anomalies.

The specimen was presented to the histological laboratory by Ashton Barbour, of Charlottesville, Va., six hours after it had been removed from an apparently normal year-old hen. He described it as having been taken from the "egg-bag." When questioned, he was positive that he had noticed a number of developing eggs, "little yellow balls," attached to the dorsal surface of the abdominal cavity. His anatomical observations stopped at this point.

The specimen was roughly egg-shaped, and of a yolk or yellowish-orange color. Between ends it measured 9½ cm. Its diameter at the point of greatest width (about one third the distance from the wider end) was 8 cm. When opened the mass was found to contain an egg of average size, with a shell of normal hardness and thickness. The egg was not exactly in the center, but was placed slightly to one side and towards the larger end, causing a variation in the thickness of the lateral walls of the enveloping mass (Fig. 1). At the thickest point the lateral wall was 2 cm. thick, at the thinnest point 1 cm. At the larger end the wall measured ¾ cm. in thickness, at the smaller end it measured 1½ cm. in thickness. The weight of the enveloping portion of this yolk mass, after the enclosed egg had been removed, was about 190 gms. The general ovoid shape of the mass was presumably determined by the enclosed egg.

The mass was made up of layers of yellow, yolk-like material

between which were scattered irregular laminæ of a glairy, mucus-like substance (Fig. 2). In places these laminæ had apparently hardened to form clear, firm, gelatinous areas. The outermost yellow layer was about $1\frac{1}{2}$ mm. thick, and completely encircled the mass.

On one side, at the point of greatest diameter, there was a

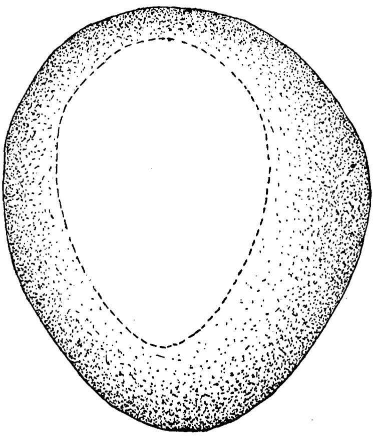

FIG. 1.

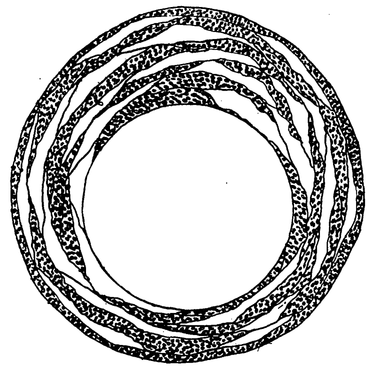

FIG. 2.

FIG. 1. Diagram of yolk mass from oviduct of hen. The inner broken line represents the outline of the inclosed normal egg. The peripheral stippled area represents the laminated envelope of yolk and albumen. Natural size.

FIG. 2. Diagram of transverse section of the yolk mass. The central circular area represents the inclosed normal egg. The peripheral stippled lamellæ represent layers of yolk, the clear lamellæ, layers of albumen. Natural size.

shallow depression, about 2 mm. deep, almost the size of a dime in circumference. This was due to a thinning of the two external enveloping layers at that point. A dark, reddish discoloration partly surrounded this depression in the form of a crescent. There were a number of small granule-like hillocks, about the size of a pinhead, on the surface of the smaller end. These elevations probably represent casts of the mouths of the oviducal glands, produced under pressure of the enlarging mass against the constricted confines of the oviducal walls.

When the egg which the mass inclosed was removed and opened, it was found to be filled with a yellowish liquid, in which there were bits of a translucent and whitish mucus-like substance, the remains most probably of the disintegrated chalazæ. The odor of this liquid was not offensive. It may be best described as musty.

Portions of the yolk mass were imbedded in celloidin, sec-

tioned, and the sections stained with hematoxylin and eosin. Transverse sections through this laminated cortical material revealed layers of yolk granules and spherules intermingled with layers of clear, hardened, egg-white. There were no indications of the presence of shell, or any unequivocal evidence of shell membrane, in any of the sections.

Abnormal eggs have been observed and discussed by biologists for many years. In the AMERICAN NATURALIST for January, 1906, G. H. Parker (4) has treated the subject of double hens'-eggs, "ovum in ovo," very fully. He reviews much of the previous literature on the subject and describes several specimens of his own, similar to a specimen of a large, double egg which belongs to the laboratory of histology here. Parker supports the theory of Davaine (2) and others concerning the formation of double eggs.

Briefly the theory is this: The egg is moved by peristalsis from the ovary to the distal end of the oviduct. As it passes down the oviduct it receives the usual coverings of albumen, shell membrane, and shell. The egg is now a normal egg, ready to be laid. But for some reason, instead of the egg being laid normally, antiperistalsis occurs and the egg is carried back up the oviduct. In the upper portion of the duct it meets another developing egg coming down. The two pass down together. Albumen is laid on and a common shell covers the whole mass. We now have a giant egg, approximating the size of an ostrich egg, which contains a second complete normal egg along with its own yolk and albumen.

Curtis (1) has described a number of interesting anomalies in hens' eggs, including double eggs and other anomalous specimens, either with a membrane only or with both shell and membrane. She reports finding eggs in the body cavity of fowls whose oviduct had been ligated in the isthmus, or shell gland. She does not venture to commit herself, however, as to whether antiperistalsis is the means by which the egg is carried back up the duct. Patterson (5) describes a specimen which has two shell membranes. He explains this condition on the assumption that antiperistalsis had occurred twice before the egg was laid. Hargitt (3) describes an interesting gourd-shaped egg. None of these authors, however, mention an anomaly similar to our specimen.

What may be assumed to have happened in the formation of

our specimen was this: The first egg which left the ovary of the young hen passed down the oviduct normally and had albumen and shell laid on in the usual manner. The egg passed on into the lower part of the uterus (shell gland), but, due to injury, congenital occlusion of the vagina, or some obstruction, the egg could not be laid. Such interference with normal oviposition, either congenital or acquired, stimulated a reversed movement (probably antiperistalsis) and the normal egg was carried back up into the oviduct and lodged there. More eggs left the ovary, took on albumen as they passed down the duct, but coming into contact with the preceding egg which occluded the duct, where broken by pressure, and the soft yolk and albumen collected about the obstructing egg. In this way the yolk mass about the egg acquired its large dimensions.

We can thus locate very closely the exact position of the anomalous yolk mass in the oviduct of the hen. Since it contained layers of albumen it must have lodged below, or in the lower part of the portion of the oviduct where albumen is laid onto the yolk; and since there was no shell whatever within the cortex of the mass, it must have lodged above the point in the oviduct where shell is formed. Again, antiperistalsis, or at least reversal of normal movement, must have occurred because the inclosed egg comprised a shell, and so must itself have gone the full length of the oviduct into the uterus, while at the time the enveloping yolk mass was formed the original egg must have been above the shell-forming level.

The above evidence, combined with the evidence of Davaine (cited by Parker) and Curtis, who report finding soft-shelled eggs in the body cavity of fowls, seems to prove conclusively that something of the nature of antiperistalsis in the oviduct does occur. The inference seems warranted with regard to our specimen, that if the included normal egg could have retraced its course down the oviduct in company with the next following egg, instead of lodging permanently in the preuterine portion of the oviduct, a common shell would have been laid onto the two eggs. This shell would have included the two together, and the result would have been an ordinary "ovum in ovo," similar to the ones described by Davaine, Parker, Patterson, Hargitt, Curtis and many others.

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THE HEREDITY OF ORANGE EYE COLOR IN DROSOPHILA MELANOGASTER[1]

THERE are three points of special interest in the heredity of orange eye color. First, the eye color is due to the presence of two sex-linked genes; second, these two genes may separate in the F_1 female when orange is crossed to the wild stock, producing in F_2, in addition to orange and wild type males, a third eye color called salmon[2]; third, when an orange male is crossed to the parent stock, reduced, only orange and wild type males appear in F_2.

Orange first appeared in the sixth generation of the plus selected line of the mutant strain reduced. Eleven males appeared from a single pair of parents. Several of these males (orange reduced) were mated to wild type females. All F_1 flies had red eyes. Twenty-seven F_1 pairs were mated (Table I). Of the F_2 males 850 were wild type (red-eyed), 785 were orange reduced, 585 were reduced, 586 salmon, 15 orange, and 6 salmon reduced. This behavior led us to suspect that orange

[1] Contribution No. 182.

[2] Since this paper went to press Professor Morgan kindly sent us some stock of garnet. The crosses show salmon and garnet to be the same.